

# (12) International Application Status Report

**Received at International Bureau:** 13 April 2015 (13.04.2015)

**Information valid as of:** 25 August 2015 (25.08.2015)

**Report generated on:** 19 January 2020 (19.01.2020)

**(10) Publication number:**

WO2015/146175

**(43) Publication date:**

01 October 2015 (01.10.2015)

**(26) Publication language:**

Japanese (JA)

**(21) Application Number:**

PCT/JP2015/001717

**(22) Filing Date:**

26 March 2015 (26.03.2015)

**(25) Filing language:**

Japanese (JA)

**(31) Priority number(s):**

2014-067071 (JP)

**(31) Priority date(s):**

27 March 2014 (27.03.2014)

**(31) Priority status:**

Priority document received (in compliance with PCT Rule 17.1)

2014-067075 (JP)

27 March 2014 (27.03.2014)

Priority document received (in compliance with PCT Rule 17.1)

2014-067077 (JP)

27 March 2014 (27.03.2014)

Priority document received (in compliance with PCT Rule 17.1)

2014-067078 (JP)

27 March 2014 (27.03.2014)

Priority document received (in compliance with PCT Rule 17.1)

**(51) International Patent Classification:**

G02B 15/20 (2006.01)

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**(54) Title (EN):** ZOOM LENS, IMAGING DEVICE, AND ZOOM LENS PRODUCTION METHOD

**(54) Title (FR):** OBJECTIF À FOCALE VARIABLE, DISPOSITIF D'IMAGERIE, ET PROCÉDÉ DE PRODUCTION D'OBJECTIF À FOCALE VARIABLE

**(54) Title (JA):** ズームレンズ、撮像装置及びズームレンズの製造方法

**(57) Abstract:**

**(EN):** The present invention includes, in order from the object side, a first lens group (G1) having a positive refractive power, a second lens group (G2) having a negative refractive power, a third lens group (G3) having a negative refractive power, and a fourth lens group (G4) having a positive refractive power. The air gap between the first lens group (G1) and the second lens group (G2) is varied to vary magnification, and conditional formula (1) ( $\#.\#\#<\#\#\#\#\#\#<\#.\#5$ ), in which  $f_4$  is the focal distance of the fourth lens group (G4) and  $f_w$  is the focal distance of the entire system in a wide angle end state during infinity focusing, is satisfied.

**(FR):** La présente invention comprend, dans l'ordre depuis le côté objet, un premier groupe de lentilles (G1) ayant une réfringence positive, un deuxième groupe de lentilles (G2) ayant une réfringence négative, un troisième groupe de lentilles (G3) ayant une réfringence négative, et un quatrième groupe de lentilles (G4) ayant une réfringence positive. L'espacement d'air entre le premier groupe de lentilles (G1) et le deuxième groupe de lentilles (G2) est modulé pour faire varier le grossissement, et la formule conditionnelle (1) ( $\#.\#\#<\#\#\#\#\#\#<\#.\#5$ ), dans laquelle  $f_4$  est la distance focale du quatrième groupe de lentilles (G4) et  $f_w$  est la distance focale du système entier dans un état d'extrémité de grand angle pendant une mise au point à l'infini, est satisfaite.

**(JA):** 物体側から順に並んだ、正の屈折力を有する第1レンズ群(G1)と、負の屈折力を有する第2レンズ群(G2)と、負の屈折力を有する第3レンズ群(G3)と、正の屈折力を有する第4レンズ群(G4)とを有し、第1レンズ群(G1)と第2レンズ群(G2)との空気間隔を変化させることにより変倍し、次の条件式(1)を満足する。  $0.60 < f$

$4 / f_w < 1.15$  ... (1) 但し、 $f_4$ :第4レンズ群(G4)の焦点距離、 $f_w$ :無限遠合焦時における広角端状態の全系の焦点距離。

**International search report:**

Received at International Bureau: 29 June 2015 (29.06.2015) [JP]

**International Report on Patentability (IPRP) Chapter II of the PCT:**

Not available

**(81) Designated States:**

AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW

European Patent Office (EPO) : AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR

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Eurasian Patent Organization (EAPO) : AM, AZ, BY, KG, KZ, RU, TJ, TM